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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,620	12/16/2003	Tsutomu Yamakawa	246790US2SCONT	2638
22850	7590	12/21/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.			LEE, SHUN K	
1940 DUKE STREET			ART UNIT	
ALEXANDRIA, VA 22314			PAPER NUMBER	
			2884	

DATE MAILED: 12/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/735,620	<b>Applicant(s)</b> YAMAKAWA, TSUTOMU	
	<b>Examiner</b> Shun Lee	<b>Art Unit</b> 2884	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 October 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3 and 5-9 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3 and 5-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/521,901.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Specification*

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3, and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Comanor *et al.* (Algorithms to identify detector Compton scattering in PET modules, IEEE Transactions on Nuclear Science, Vol. 43, no. 4 (August 1996), pp. 2213-2218) in view of Kamae *et al.* (US 4,857,737).

In regard to claims 1 and 3, Comanor *et al.* disclose a nuclear medical diagnostic apparatus, comprising:

(a) a radiation detector in a form of a single layer including a plurality of semiconductor cells (*i.e.*, PIN photodiode based design; section I) that (1) are arranged in a matrix (*e.g.*, an 8x8 array; section I), (2) detect radiation separately, and (3) output signals representing an energy of the radiation separately (section II);

- (b) a selection circuit (*i.e.*, algorithm; section III) which, in order to select, among events wherein the radiation is detected, a specific event wherein a total energy of not less than two respective signals substantially simultaneously output from not less than two semiconductor cells falls in a predetermined energy window (*e.g.*, less than 200 keV; section II); and
- (c) a position calculation circuit (*i.e.*, algorithm; section III) configured (1) to select one semiconductor cell of said not less than two semiconductor cells based only on respective energies of the not less than two respective signals (*e.g.*, a minimum energy), and (2) to calculate an incidence position based on a position of the selected one semiconductor cell.

While Comanor *et al.* also disclose that the positron emission tomography (*i.e.*, PET; section II) apparatus suitable for imaging humans or small animals (section VII), the apparatus of Comanor *et al.* lacks an explicit description of a circuit configured to generate a distribution of a radio-isotope injected into a subject on the basis of a counting result from a counting circuit configured to count the specific event wherein the radiation is detected from the radio-isotope in association with the calculated incidence position. However, the components of a PET apparatus are well known in the art. For example, Kamae *et al.* teach that a nuclear medical diagnostic apparatus comprises a counting circuit (15 and 16 in Fig. 7) configured to count the specific event in association with the calculated incidence position (column 8, lines 61-67) and a circuit (15 and 16 in Fig. 7) configured to generate a distribution of radio-isotope in the subject on the basis of a counting result (column 8, line 67 to column 8, line 2). Therefore it

would have been obvious to one having ordinary skill in the art at the time of the invention to provide a circuit configured to generate a distribution of a radio-isotope injected into a subject on the basis of a counting result from a counting circuit configured to count the specific event wherein the radiation is detected from the radio-isotope in association with the calculated incidence position in the apparatus of Comanor *et al.*, in order to obtain a PET image of a human or small animal.

In regard to claim 7, the method steps are implicit for the apparatus of Comanor *et al.* since the structure is the same as the applicant's apparatus of claim 1.

In regard to claim 8 (which is dependent on claim 1) and claim 9 (which is dependent on claim 7), Comanor *et al.* also disclose (section III) that the position calculation circuit is configured to calculate the incidence position as a central position of the selected one semiconductor cell.

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cho *et al.* (Resolution and sensitivity improvement in positron emission tomography by the first interaction point determination, Conference Record of the 1991 IEEE Nuclear Science Symposium and Medical Imaging Conference (Cat. No.91CH3100-5), Santa Fe, NM, USA, Vol. 3 (November 2-9, 1991), pp. 1623-1627) in view of Kamae *et al.* (US 4,857,737).

In regard to claim 5, Cho *et al.* disclose a nuclear medical diagnostic apparatus, comprising:

- (a) a radiation detector in a form of a single layer including a plurality of semiconductor cells (*i.e.*, avalanche photodiode; section II) that (1) are arranged in

- a matrix (see Fig. 1), (2) detect radiation separately, and (3) output signals representing an energy of the radiation separately (section II);
- (b) a selection circuit (*i.e.*, correction scheme; section II) which, in order to select, among events wherein the radiation is detected, a specific event wherein a total energy of not less than two respective signals substantially simultaneously output from not less than two semiconductor cells falls in a predetermined energy window (section II); and
- (c) a position calculation circuit (*i.e.*, correction scheme; section II) configured (1) to select one semiconductor cell of said not less than two semiconductor, and (2) to calculate an incidence position based on a position of the selected one semiconductor cell,
- wherein said position calculation circuit is configured to select, from said not less than two semiconductor cells, said one semiconductor cell that outputs a signal representing a minimum energy, when said not less than two semiconductor cells are located in a first area (*i.e.*, areas of small angle scatter; section II), and to select said one semiconductor cell that outputs a signal representing a maximum energy, when said not less than two semiconductor cells are located in a second area (*i.e.*, areas of large angle scatter; section II).

While Cho *et al.* also disclose that a positron emission tomography (*i.e.*, PET; section I) apparatus, the apparatus of Cho *et al.* lacks an explicit description of a circuit configured to generate a distribution of a radio-isotope injected into a subject on the basis of a counting result from a counting circuit configured to count the specific event wherein the

radiation is detected from the radio-isotope in association with the calculated incidence position. However, the components of a PET apparatus are well known in the art. For example, Kamae *et al.* teach that a nuclear medical diagnostic apparatus comprises a counting circuit (15 and 16 in Fig. 7) configured to count the specific event in association with the calculated incidence position (column 8, lines 61-67) and a circuit (15 and 16 in Fig. 7) configured to generate a distribution of radio-isotope in the subject on the basis of a counting result (column 8, line 67 to column 8, line 2). Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a circuit configured to generate a distribution of a radio-isotope injected into a subject on the basis of a counting result from a counting circuit configured to count the specific event wherein the radiation is detected from the radio-isotope in association with the calculated incidence position in the apparatus of Cho *et al.*, in order to obtain a PET image.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Comanor *et al.* (Algorithms to identify detector Compton scattering in PET modules, IEEE Transactions on Nuclear Science, Vol. 43, no. 4 (August 1996), pp. 2213-2218) in view of Kamae *et al.* (US 4,857,737) as applied to claim 1 above, and further in view of DiFilippo *et al.* (US 5,793,045).

In regard to claim 6 which is dependent on claim 1, the modified apparatus of Comanor *et al.* lacks that said selection circuit is configured to calculate time differences between a signal output from one of said plurality of semiconductor cells and signals output from remaining cells of said plurality of semiconductor cells. DiFilippo *et al.*

teach (column 5, lines 33-44) an internal coincidence circuit configured to determine a time difference among a plurality of signals output from said radiation detector, in order determine if signals occur within a predetermined time interval. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide an internal coincidence circuit in the modified apparatus of Comanor *et al.*, in order to determine if signals occur within a predetermined time interval as taught by DiFilippo *et al.*

### ***Response to Arguments***

6. Applicant's arguments with respect to amended independent claims and claims depending therefrom have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Tuesday-Friday.

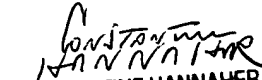
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 2884

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SL

  
CONSTANTINE HANNAHER  
PRIMARY EXAMINER